CLAIMS

1. An optical waveguide material made up of a crystal having a composition of $KTaO_3$ (KT);

wherein at least one element selected from the group consisting of Zr, Hf, and Sn substitutes for a portion of one element of the constituent elements of KT, and

the crystal has the same perovskite type crystal structure as KT.

2. The optical waveguide material according to claim 1, wherein the crystal has a composition obtained by replacing a portion of one element of the constituent elements of KT with other element.

3. The optical waveguide material according to either claim 1 or claim 2, wherein the optical waveguide material is made up of a crystal ($KTa_{1-x}Nb_xO_3$: KTN: $0 <= x <= 1$) having a composition obtained by substituting Nb for a portion of Ta of KT.

4. The optical waveguide material according to claim 3, wherein the optical waveguide material is made up of a crystal ($K_{1-y}Li_yTa_{1-x}Nb_xO_3$: KLTN: $0 <= x, y <= 1$) having a composition obtained by substituting Li for a portion of K of KTN.

5. A method of manufacturing an optical waveguide material made up of a crystal that has a composition of $KTaO_3$ (KT) and has the perovskite type crystal structure, comprising:

a first step of mixing a raw material containing at least one element selected from the group consisting of Zr, Sn, and Hf and main raw materials containing K and Ta;

a second step of heating the mixed raw materials to prepare high-temperature melt; and

a third step of cooling the high-temperature melt to grow a crystal.

6. The method of manufacturing an optical waveguide material according to claim 5, wherein the crystal of the optical waveguide material has a composition obtained by replacing a portion of one element of the constituent elements of KT with other element.

7. The method of manufacturing an optical waveguide material according to either claim 5 or claim 6, wherein the first step includes further mixing of a raw material containing Nb in the main raw materials.

8. The method of manufacturing an optical waveguide material according to claim 7, wherein the first step includes further mixing of a raw material containing Li with the main materials.

9. An optical waveguide comprising a core and a clad whose refractive index is lower than that of the core;

wherein at least either of a core material or a clad material is a crystal that has a composition of $KTaO_3$ (KT), at least one element selected from the group consisting of Zr, Hf, and Sn substitutes for a portion of one element of the constituent elements of KT, and the crystal has the same perovskite type crystal structure as KT, and

the refractive index difference between the core and the clad is controlled by the amount of the at least one element selected from the group consisting of Zr, Hf, and Sn.

10. The optical waveguide according to claim 9, wherein the crystal has a composition obtained by replacing a portion of one element of the constituent elements of KT with other element.

11. The optical waveguide according to either claim 9 or claim 10, wherein at least either the core material or the clad material is made up of a crystal ($KTa_{1-x}Nb_xO_3$: KTN: $0 <= x <= 1$) having a composition obtained by substituting Nb for a portion of Ta of KT.

12. The optical waveguide according to claim 11, wherein at least either the core material or the clad material

is made up of a crystal ($K_{1-y}Li_yTa_{1-x}Nb_xO_3$: KLTN: 0 <= x, y <= 1) having a composition obtained by substituting Li for a portion of K of KTN.